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Supercedes IGS-15195 (05/02)
Preparing Activity: LANTNAVFACENGCOM Based on UFGS-15195

ITALIAN GUIDE SPECIFICATIONS

Use for ITALIAN projects only

SECTION 15195

NATURAL GAS AND LIQUID PETROLEUM PIPING
02/03

NOTE: This guide specification is issued by the
Atlantic Division, Naval Facilities Engineering
Command for regional use in Italy.

NOTE: This guide specification covers both exterior
and interior fuel gas piping. It is intended for
use when specifying buried polyethylene piping

Comments and suggestion on this specification are
welcome and should be directed to the technical
proponent of the specification. A listing of the
technical proponents, including their organization
designation and telephone number, is on the Internet.

Use of electronic communication is encouraged.

Brackets are used in the text to indicate designer
choices or locations where text must be supplied by
the designer.

NOTE: The following information shall be shown on
the project drawings:

1. Layout and location of piping.
2. Location of appurtenances, valves, etc.
3. Details of method of mounting piping.
4. Capacity of pressure regulators
5. Location and capacity of LP gas containers.

PART 1 GENERAL

1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to in the text by the basic designation only.

AMERICAN NATIONAL STANDARDS INSTITUTE (ANSI)

ANSI Z21.70 (1981) Earthquake Actuated Automatic Gas Shutoff Systems

EUROPEAN COMMUNITY QUALITY MARKS (CE)

NOTE: CE (European Community) is a European quality marking system indicating that the equipment or product conforms to EEC (European Economic Community) standards concerning quality of safety and health and conforms with all the Italian technical standards in force. All products (Electrical, Mechanical and Electronic Equipment and similar items) that are marked CE conform to the standards and Laws enforced in Europe. In Italy, the CE marking is a mandatory requirement and must be shown on all applicable equipment and products attesting to the conformity with the EEC standards.

CE European Quality Mark

INTERNATIONAL ORGANIZATION FOR STANDARDIZATION (ISO)

NOTE: An ISO Standard is published by the International Standard Organization which is a worldwide federation of national standards bodies from 120 countries. ISO standards cover all fields except electric and electronical engineering standards. ISO's are available in both English and French language.

ISO 7349 (1983) Thermoplastics valves - Connection references

ITALIAN WELDING INSTITUTE (IIS)

IIS (1997) Italian Welding Institute Publications and Manuals

ITALIAN LAWS AND NORMS (D.M.)(LAW)(CIRC.)

NOTE: Italian laws and normatives are the legislative regulations and decrees issued by the Italian government in the form of laws, norms, decrees, circulars, and letters. These Laws and Decrees concur together with Norms and Standards in forming the governing directives for construction.

D.M. 24/11/84	Fire protection safety norms for transport, distribution, storage and use of natural gas having density not greater than 0.8
D.M. 13/10/94	Approval of fire prevention technical regulation for design, construction, installation and functioning of L.P.G. storage in fixed tanks greater than 5 cubic meters, and/or in mobile recipients greater than 5,000 kg
D.M. 16/11/99	Modification to D.M. 24 November 1984: "Fire protection safety norms for transport, distribution, storage and use of natural gas having density not greater than 0.8"
D.M. 10/5/01	LPG storage in fixed tanks, having total capacity of 5 cubic meters, located in areas with relevant accident risk, and subject to the obligation of safety report presentation (Official Gazette n. 118, 23 May 2001)
D.P.R. 447	(6/12/1991) Regulation of accomplishment of Law 46/90 concerning safety of systems
D.L. 242	(19/3/1996) Modifications and supplements to D.L. 19 September 1994, n. 626, containing accomplishment of EEC Directives concerning the improvement of safety and health of workers on the job sites (Official Gazette n. 104, 6 May 1996)
D.L. 626	(19/9/1994) Implementation of Requirements, 89/391/CEE, 89/655/CEE, 89/656/CEE, 90/269/CEE, 90/270/CEE, 90/394/CEE, and 90/679/CEE concerning improvement of safety and health of workers in the working place

Law 46	(5/3/1990) Safety norms for systems
Law 1083	(6/12/1971) Safety regulations for the use of combustible gas (Official Gazette n. 320, 20 December 1971)

ITALIAN NATIONAL ASSOCIATION FOR UNIFICATION OF STANDARDS (UNI)

**NOTE: A UNI Norm is a technical normative
recognized as Italian Law, submitted by a private
organization "Ente Nazionale Italiano di
Unificazione" for Italy and is available only in
the Italian language. It is the National Standard.**

UNI 3740-1	(1999) Steel fasteners - Technical specifications - Generalities
UNI 5311	(1963) Gripping and holding appliances - Straps, clamps, squares and bearings - Summary of standard types
UNI 5634	(1997) Identification systems for pipelines and canalizations conveying fluids
UNI 5731	(1965) Cup square bolts and bolts with square nut - ISO metric coarse thread - Finish C
UNI 5732	(1965) Cup square bolts with hexagon nut - ISO metric coarse thread - Finish C
UNI 7140/FA-1	(1993/95) Domestic gas burning appliances - Flexible non metallic hoses
UNI 7323/1	(1974) Fasteners with particular characteristics - Technical requirements - Generalities
UNI 7987	(1979) Gas meters - Terms and definitions
UNI 7988/FA-1	(1986) Gas meters - Safety and metrology requirements
UNI 8213	(1987) LPG storage for central plants in fixed tanks up to 5 m3 overall capacity - Design, installation and operation
UNI 8463	(1984) Manually operated stop devices for internal gas-fired appliances - Manually operated taps for cooking appliances - Safety requirements

UNI 8849/FA-1	(1987/90) Polyethylene (PE 50) fittings, for fusion with heated tools, for use with polyethylene pipes for the supply of gaseous fuels - Types, dimensions and requirements
UNI 8850/FA-1	(1988/90) Polyethylene (PE 50) electro-fusion fittings for the supply of gaseous fuels - Types, dimensions and requirements
UNI 8863/FA-1	(1987/89) Unalloyed steel seamless and welded tubes suitable for screwing in accordance with UNI ISO 7/1
UNI 8917	(1987) Gas burning appliances - Automatic valves
UNI 9099	(1989) Steel pipes for buried or submerged pipelines - External polyethylene coating applied by extrusion
UNI 9164	(1994) Ductile iron pipes, fittings and accessories for pressure pipe-lines - Mechanical flexible joint - Coupling dimensions and joint accessories
UNI 9165/A1/A2	(1987/97/00) Gas distribution networks with maximum working pressures up to 5 bar - Design, construction and testing
UNI 9245/A1	(1988/99) Interception devices for gas distribution and/or transportation systems - Butterfly valves
UNI 9734	(1991) Shut-off devices for gas lines - Steel valves with ball stopper
UNI 9736	(1990) Plastics (PE) joints of pipes and fittings made with the same plastics or made of metal and plastics (PE) for buried pipes for the supply of gaseous fuels - Types, requirements and tests
UNI 9737	(1997) Classification and qualification of welders for plastic materials - Welders by the heated tool procedure, with mechanical equipment and by electrofusion for pipes and fittings of polyethylene for the supply of gaseous fuels, water and others fluids under pressure
UNI 9891	(1998) Corrugated flexible safety metallic

	hose assemblies for the connection of gas appliances for domestic and similar uses
UNI 9892	(1991) Quick acting connection for coupling between valves and LPG tanks - Safety requirements
UNI 10520	(1997) Welding of plastic materials - Heated tool butt welding - Welding of polyethylene pipes and/or fittings for gas, water and others pressure fluids pipelines
UNI 10521	(1997) Welding of plastic materials - Electro-fusion welding - Welding of polyethylene pipes and/or fittings for gas, water and others pressure fluids pipelines
UNI 10576	(1996) Gas pipelines protection during underground works
UNI 10832	(1999) LPG mounded storage systems - Design, construction and control - Safety requirements
UNI 10910-1	(2001) Plastics piping systems for water supply - Polyethylene (PE) - General
UNI 10910-3	(2001) Plastics piping systems for water supply - Polyethylene (PE) - Fittings
UNI 10967	(2001) Welding of polyethylene pe 100 pipes and connections for gas, water and other pressure fluids pipelines
UNI 11003	(2002) Gas meters - Gas meters with metering pressure not greater than 0,07 bar - Control procedures

ITALIAN/EUROPEAN HARMONIZATION STANDARDS (UNI EN)(UNI ENV)(CEI EN)
(UNI EN ISO)(UNI ISO)

NOTE: A UNI EN, UNI ENV, CEI EN, UNI EN ISO or UNI ISO is a European Standard with a coincident Italian National Standard or International Standard. The two standards are identical, with most (but not all) EN's available in the English language and the UNI available only in the Italian language.

UNI ISO 7-1	(1984) Pipe threads where pressure-tight
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	joints are made on the threads - Part 1: Dimensions, tolerances and designation
UNI EN 287-1/A1	(1993/98) Approval testing welders - Fusion welding -Part 1: Steels
UNI EN 288-2/A1	(1993/98) Specification and qualification of welding procedures for metallic materials - Part 2: Welding procedure specification for arc welding
UNI EN 331	(1999) Manually operated ball valves and closed bottom taper plug valves for gas installations for buildings
UNI EN 969/A1	(1996/99) Ductile iron pipes, fittings accessories and their joints for gas pipelines - Requirements and test methods
UNI EN 1092-2	(1999) Flanges and their joints - Circular flanges for pipes, valves, fittings and accessories, PN designated - Part 2: Cast iron flanges
UNI EN 1762	(1999) Rubber hoses and hose assemblies for liquefied petroleum gas, LPG (liquid or gaseous phase), and natural gas up to 25 bar (2,5 MPa) - Specification
UNI EN 1775	(1999) Gas supply - Gas pipework for buildings - Maximum operating pressure Š 5 bar - Functional recommendations
prEN 1555-2	(2002) Plastics piping systems for the supply of gaseous fuels - Polyethylene (PE) - Part 2: Pipes
UNI EN ISO 3677	(1996) Filler metal for soft soldering, brazing and braze welding - Designation
UNI ISO 4437	(1988) Buried polyethylene (PE) pipes for the supply of gaseous fuels_- Metric series - Specifications
UNI ISO 6150	(1990) Pneumatic fluid power - Cylindrical quick-action couplings for maximum working pressures of 10 bar, 16 bar and 25 bar (1 MPa, 1,6 MPa and 2,5 MPa) - Plug connecting dimensions, specifications, application guidelines and testing
UNI EN 10208-1	(1999) Steel pipes for pipelines for combustible fluids - Technical delivery conditions - Pipes of requirement class A

UNI EN 10208-2	(1998) Steel pipes for pipelines for combustible fluids - Technical delivery conditions - Pipes of requirement class B
UNI EN 10241	(2002) Steel threaded pipe fittings
UNI EN 10242	(2001) Threaded pipe fitting in malleable cast iron
UNI EN 10253-1	(2002) Butt-welding pipe fittings - Wrought carbon steel for general use and without specific inspection requirements
UNI EN 12106	(1999) Plastics piping systems - Polyethylene (PE) pipes - Test method for the resistance to internal pressure after application of squeeze-off

SHEET METAL & AIR CONDITIONING CONTRACTORS' NATIONAL ASSOCIATION
(SMACNA)

SMACNA SRM	(1998) Seismic Restraint Manual Guidelines for Mechanical Systems
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1.3 RELATED REQUIREMENTS

Section 15050, "Basic Mechanical Materials and Methods," applies to this section, with additions and modifications specified herein.

1.4 SUBMITTALS

NOTE: Where a "G" in submittal tags follows a submittal item, it indicates Government approval for that item. Add "G" in submittal tags following any added or existing submittal items deemed sufficiently critical, complex, or aesthetically significant to merit approval by the Government. Submittal items not designated with a "G" will be approved by the QC organization.

Submit the following in accordance with Section 01330, "Submittal Procedures."

SD-03 Product Data

Valve box

Pressure regulator

Gas equipment connectors

Valves

Warning and identification tape

Risers

Transition fittings

Gas meter

[LPG containers and accessories]

SD-07 Certificates

Welder's qualifications

PE welder's qualifications

Welder's identification symbols

NOTE: "ISTITUTO ITALIANO DELLA SALDATURA" (Welding Italian Institute) certifies welders. It is part of EWF (European Welding Federation). See Web Site www.iis.it

Submit a copy of a certified UNI EN 287-1/A1 and IIS qualification test report for each welder and welding operator. Submit the assigned number, letter, or symbol that will be used in identifying the work of each welder.

SD-08 Manufacturer's Instructions

PE pipe and fittings

Submit manufacturer's installation instructions and manufacturer's visual joint appearance chart.

1.5 QUALITY ASSURANCE

1.5.1 Welder's Qualifications

Comply with UNI EN 287-1/A1 and IIS. The steel welder shall have a copy of a certified qualification test report issued by the Italian Welding Institute. The PE welder shall be certified as per UNI 9737, IIS, and shall have a certificate from a PE pipe manufacturer's sponsored training course. Contractor shall also conduct a qualification test. Submit each welder's identification symbols, assigned number, or letter, used to identify work of the welder. Affix symbols immediately upon completion of welds. Welders making defective welds after passing a qualification test shall be given a requalification test and, upon failing to pass this test, shall not be permitted to work this contract.

1.5.2 PE Welder's Qualifications

Prior to installation, Contractor shall have supervising and installing personnel trained by a PE pipe manufacturer's sponsored course of not less than one week duration, or present proof satisfactory to the Contracting Officer that personnel are currently working in the installation of PE gas distribution lines.

1.5.3 Safety Standards

D.M. 24/11/84, D.M. 16/11/99, D.L. 242, D.P.R. 447, D.L. 626, Law 46, and Law 1083.

1.6 DELIVERY, STORAGE, AND HANDLING

Handle, transport, and store plastic pipe and fittings carefully. Plug or cap pipe ends during transportation or storage to minimize dirt and moisture entry. Do not subject to abrasion or concentrated external loads. Discard PE pipe sections and fittings that have been damaged.

PART 2 PRODUCTS

2.1 SOURCE MANUFACTURERS

2.1.1 Steel Pipe and Fittings

The following manufacturers provide steel piping materials and fitting components that generally comply with these specifications:

DALMINE

Piazza Caduti 6 Luglio 1944, 1
24044 Dalmine (BG) Italy
Tel: 035-5601111
Fax: 035-5603827
www.dalmine.it

ARVEDI TUBI ACCIAIO

Zona Porto Canale
26100 Cremona
Tel: 0372/4091
Fax: 0372/413170
www.arvedi.it

NOVA SIRA S.r.l.

Via delle Rocchette, 4
10060 Bibiana
Tel: 0121/559239
Fax: 0121/ 55127
www.novasira.it

OFFICINA MECCANICA FASANO snc

Corso Matteotti, 27
10023 Chieri (TO)
Tel: 011/ 9472122

Fax: 011/ 9490506

IANNONE ARM S.p.A.
Via Nuova Villa, 29
80100 Napoli
Tel: 081-7523788
Fax: 081-7523425

IANNONE TUBI s.r.l.
Via Biagio Accolti Gil - zona industriale
Bari
Tel: 080-5311448
Fax: 080-5312976

2.1.2 Plastic Pipe and Fittings

The following manufacturers provide plastic based piping materials and fitting components that generally comply with these specifications:

UNIDELTA S.p.A.
Via Capparola Sotto, 4
25078 Vestone (BS)
Tel: 0365/878011
Fax: 0365/878080
www.unidelta.it

GRES DALMINERESINE WAVIN
Via Dossi
24040 Levate (BG)
Tel: 035/4549759
Fax: 035/337085
E-mail:info@gdw.it

PALBOX INDUSTRIALE S.p.A.
via U. Foscolo, 8
20060 Basiano (MI)
Tel: 02-9576-0221
Fax: 02-9576-1481

DALMINE
Piazza Caduti 6 Luglio 1944, 1
24044 Dalmine (BG) Italy
Tel: 035-5601111
Fax: 035-5603827
www.dalmine.it

VON ROLL S.p.A.
Via Della Tecnica, 2
21040 Origgio - Varese
Tel: 035-560111
Fax: 035-5603827

2.1.3 Valves

The following manufacturers provide various below ground and above ground shutoff valves and accessory components that generally comply with these specifications:

BONETTI RUBINETTERIE VALDUGGIA
Loc. Molino Rastelli, 2
I-13018 Valduggia (VC) Italy
Tel: +39 0163 48062
Fax: +39 0163 48188
<http://www.br.v.it>
e-mail:comm@br.v.it

RIV RUBINETTERIE ITALIANE VALVOLE S.p.A.
Via delle Acacie, 8 Z.I.D4
28075 Grignasco (NO) - Italy
Tel: 0163-4151
Fax: 0163-411914
e-mail:riv-vg@riv-vg.com

GREINER S.p.A.
Via Montesuello, 212
25065 Lumezzane (BS)
Tel: 030-8927511
Fax: 030-8927590
www.greiner.it

TARTARINI S.p.A.
Via P. Fabbri, 1
40013 Castel Maggiore (BO) Italy
Tel: 051-4190611
Fax: 051-4190715
E-mail: tartarini@mail.asianet.it

EURONOVA INTERNATIONAL S.r.l.
4, Rocchette
10060 Bibiana
Tel: 0121-559514
www.euronova.net

RASTELLI RUBINETTERIE S.p.A.
Regione Monticelli, 10/14
28045 Inverio (NO)
Tel: 0322-255431
Fax: 0322-255117
www.rastelli.it

KSB ITALIA S.p.A.
Viale Tunisia, 46
20214 Milano
Tel: 02-6274-3273
Fax: 02-6698-3272

VALVOSTEEL s.r.l.
via dei Mille, 7

20098 San Giuliano Milanese
Tel: 02-9849-0956
Fax: 02-9840169

RAIMONDI VALVOLE S.p.A.
Via Castellana, 47
20027 Rescaldina - Milano
Tel: 0331-575111
Fax: 0331-464772

2.1.4 Pressure Regulator Valves

The following manufacturers provide gas system pressure regulator valves that generally comply with these specifications:

VALDENASSI EMANUELE MARIA d.i.
Strada Redentore, 19 bs
10020 Moncalieri Fraz. Revigliasco, Torino
Tel: 011-8131184
Fax: 011-8131919
www.valdenassi.com

TARTARINI S.p.A.
Via P. Fabbri, 1
40013 Castel Maggiore (BO) Italy
Tel: 051/4190611
Fax: 051/4190715
E-mail: tartarini@mail.asianet.it

PIETRO FIORENTINI S.p.A.
via Rossellini, 1
20124 Milano
Tel: 02-6961421
Fax: 02-6880457
www.fiorentini.com

2.1.5 Gas Meters

The following manufacturers provide gas meters that generally comply with these specifications:

TARTARINI S.p.A.
Via P. Fabbri, 1
40013 Castel Maggiore (BO) Italy
Tel: 051/4190611
Fax: 051/4190715
E-mail: tartarini@mail.asianet.it

PIETRO FIORENTINI S.p.A.
via Rossellini, 1
20124 Milano
Tel: 02-6961421
Fax: 02-6880457
www.fiorentini.com

2.1.6 Valve Boxes

The following manufacturers provide valve boxes that generally comply with these specifications:

VALVOTUBI IND S.r.l.
Via M. Monti, 30/B
48100 Ravenna - Italy
Tel: (0039) 544/452279
Fax: (0039) 544/451148

RIP Rubinetterie Industriali Piemontesi S.p.A.
Via Reycend, 10
10148 Torino
Tel: 011/2203444
Fax: 011/2165981

2.1.7 Casing

The following manufacturers provide underground piping for casing that generally complies with these specifications:

MARCEGAGLIA S.p.A.
via Bresciani, 16
46040 Gazoldo Ippoliti - Mantova
Tel: 0376-6851
Fax: 0376-685600
www.gruppomarcegaglia.com

DALMINE
Piazza Caduti 6 Luglio 1944, 1
24044 Dalmine (BG) Italy
Tel: +39 035560.1111
Fax: +39 0355603827
www.dalmine.it

2.1.8 Piping Identification

The following manufacturers provide warning and identification tape for underground utility piping and identification materials for aboveground piping that generally complies with these specifications:

SETON ITALIA S.r.l.
Via Lazzaroni, 7
21047 Saronno - VA
Tel: 02-96703198
Fax: 02-96703644
www.seton.it

S.I.S.A.S. S.r.l.
Via Sputnik, 8
06074 Ellera Scalo - Corciano (PG)
Tel: 075/518641

Fax: 075/5186432
Web: www.sisas.it

FACOT CHEMICALS s.n.c.
Via Crema, 44
26010 Capralba (CR) - Italia
Tel: 0373 45.06.42 - 45.06.43
Fax: 0373 45.07.51
www.facot.it

2.1.9 Hangers and Supports

The following manufacturers provide hangers and support components for petroleum piping systems that generally comply with these specifications:

LA POLITERMICA
Via Macello, 51
39100 Bolzano
Tel: 0471/971430
Telefax: 0471/981127
www.vetribagno.com

GRINNELL SALES & DISTRIBUTION
Via San Giacomo, 260
39055 Laives (BZ)
Tel: 0471/252091
Fax: 0471/254058

PROSYSTEM
Via dell'Industria, 2
30031 Arino di Dolo (VE)
Tel: 041-5101622
Fax: 041-5131351
www.prosystemitalia.com

2.1.10 Welding Filler Material

The following manufacturers provide pipe welding filler material that generally complies with these specifications:

FRO s.r.l.
Via Torricelli, 15A
37135 Verona
Tel: 0458-291511
Fax: 0458-291500
e-mail: vendite@fro.it

AWELD s.r.l.
via Cellini, 17
20058 Villasanta (Milano)
Tel: 039-2325005
Fax: 039-2054698

2.1.11 Pipe-Thread Tape

The following manufacturers provide pipe-thread tape materials that generally comply with these specifications:

SINCERT UNIGASKET
Via Roma, 46
24067 Sarnico
Tel: 035-910328
Fax: 035-911137
e-mail: info@unigasket.it

FACOT CHEMICALS s.n.c.
Via Crema, 44
26010 Capralba (CR) - Italia
Tel: 0373 45.06.42 - 45.06.43
Fax: 0373 45.07.51
www.facot.it

2.1.12 Gaskets

The following manufacturers provide gasket materials and components for petroleum piping systems that generally comply with these specifications:

ELCOMIN s.n.c.
Via E. Fermi, 7
24064 Grumello del Monte (BG)
Tel: 035/831327
Fax: 035/ 4420496
www.elcomin.com

A.T. P. S.p.A.
Via Austria, 12/14/1c
41100 Modena
Tel: 059/2130711
Fax: 059/314085
www.atpgroup.it

2.1.13 Bolts and Nuts

The following manufacturers provide bolts, nuts, washers and similar connection hardware for petroleum piping systems that generally comply with these specifications:

SAM BULLONERIA S.r.L.
via Campiglione, 20
Fermo (AP)
Tel: 0734-628473
Fax: 0734-628863

A. AGRATI S.p.a.
Via Piave 28/30
20050 Veduggio Con Colzano (MI)
Tel: 0362-9801
Fax: 0362-910944

2.1.14 LPG Containers and Accessories

The following manufacturers provide liquid petroleum containers and accessory components for petroleum systems that generally comply with these specifications:

PEGAS srl
Via E. Medi, 2
63017 Porto San Giorgio (AN)
Tel: 0734/678647
Fax: 0734/678746
www.pegas-gpl.it

CLODIAGAS
Viale Europa, 6
35028 Piove di Sacco (PD)
Tel: 049/9704251
Fax: 049/9704230
www.clodiagas.it

VALTEK srl
Via Guicciardi, 9/c
42100 Reggio Emilia
Tel: 0522/330466
Fax: 0522/330451
www.pianeta.it/valtek/index.htm

CAVAGNA GROUP
Via Statale 11, n.11/13
25010 Ponte San Marco di Calcinato (BS)
Tel: 030/9663111
Fax: 030/9969014
www.cavagnagroup.com

3L.P. GAS srl
Via Bologna, 14
43036 Fidenza (PR)
Tel: 0524/527766
Fax: 0524/525456
www.3lpgas.com

2.2 MATERIALS AND EQUIPMENT

Conform to D.M. 24/11/84 and with requirements specified herein. Supply piping to appliances or equipment shall be at least as large as the inlets thereof.

2.3 PIPE AND FITTINGS

2.3.1 Aboveground and Within Buildings and Vaults

NOTE: For steam electric generation stations,

industrial and institutional plants, and central heating plants, use Schedule 80 black steel piping for threaded joints.

- a. Pipe: Black steel in accordance with UNI 8863/FA-1, UNI 8863/FA-1, UNI EN 10208-1, and UNI EN 10208-2, Schedule [40] [80], threaded ends for sizes 50 mm and smaller; otherwise, plain end beveled for butt welding.
- b. Threaded Fittings: UNI EN 10241 and UNI EN 10242, black malleable iron.
- c. Socket-Welding Fittings: UNI EN 969/A1, forged steel.
- d. Butt-Welding Fittings: UNI EN 10253-1, with backing rings of compatible material.
- e. Unions: UNI EN 10241 and UNI EN 10242, black malleable iron.
- f. Flanges and Flanged Fittings: UNI EN 1092-2 and UNI 9164 steel flanges. Flange faces shall have integral grooves of rectangular cross sections which afford containment for self-energizing gasket material.

2.3.2 Underground Polyethylene (PE)

PE pipe and fittings are as follows:

- a. Pipe: UNI EN 12106, UNI ISO 4437, and prEN 1555-2, 690 kPa (gage) working pressure, Standard Dimension Ratio (SDR), the ratio of pipe diameter to wall thickness, 11.5 maximum.
- b. Socket Fittings: UNI 8849/FA-1, UNI 8850/FA-1, UNI 10910-1, and UNI 10910-3.
- c. Butt-Fusion Fittings: UNI 8849/FA-1, UNI 8850/FA-1, UNI 10910-1, and UNI 10910-3, molded.

2.3.3 Risers

Manufacturer's standard riser, transition from plastic to steel pipe with 0.18 to 0.30 mm thick epoxy coating. Use swaged gas-tight construction with O-ring seals, metal insert, and protective sleeve. Provide [remote bolt-on or bracket] [or] [wall-mounted] riser supports [as indicated].

2.3.4 Transition Fittings

UNI 9736.

NOTE: Choose the applicable options from the following.

[a. Steel to Plastic (PE): As specified for "riser" except designed for steel-to-plastic with tapping tee or sleeve. Coat or wrap exposed steel pipe with heavy plastic coating.]

[b. Plastic to Plastic: [Manufacturer's standard bolt-on (PVC to PE) plastic tapping saddle tee, CE listed for gas service, rated for 690 kPa (gage), and O-ring seals.] [Manufacturer's standard slip-on PE mechanical coupling, molded, with stainless-steel ring support, O-ring seals, and rated for 1035 kPa (gage) gas service.] [Manufacturer's standard fused tapping (PE-to-PE) tee assembly with shut-off feature.]]

2.4 SHUTOFF VALVES, BELOW GROUND

[2.4.1 Metallic Ball Valves

**NOTE: Choose this paragraph or the paragraph below
entitled "PE Ball or Plug Valves."**

UNI 9734 corrosion-resisting steel, with threaded or flanged ends. Provide polytetrafluoroethylene (PTFE) seats.

]2.4.2 PE Ball or Plug Valves

D.M. 24/11/84, D.M. 16/11/99, and ISO 7349. Strength of valves shall be capable of withstanding system working pressures defined in D.M. 24/11/84 and D.M. 16/11/99.

]2.5 VALVES, ABOVEGROUND

[Provide lockable valves where indicated.]

2.5.1 Shutoff Valves, Sizes Larger Than 50 Millimeters

Steel body ball valve with flanged ends in accordance with UNI 9734. Provide PTFE seats.

[Cast-iron body plug valve in accordance with UNI 9245/A1, nonlubricated, wedge-mechanism or tapered lift plug, and flanged ends.]

2.5.2 Shutoff Valves, Sizes 50 Millimeters and Smaller

NOTE: Choose one of the options below.

[[Bronze] [Steel] body ball valve in accordance with UNI EN 331, UNI 8463, and UNI 8917, full port pattern, reinforced PTFE seals, threaded ends, and PTFE seat.]

[[Bronze] [Steel] body plug valve in accordance with UNI EN 331, UNI 8463,

and UNI 8917, straightway, taper plug, regular pattern with a port opening at least equal to the internal pipe area or round port full bore pattern, non-lubricated, PTFE packing, flat or square head stem with lever operator, 860 kPa (gage) rating, threaded ends.]

2.5.3 Pressure Regulator

Self-contained with spring-loaded diaphragm pressure regulator, kPa to mm water reduction, pressure operating range as required for the pressure reduction indicated, volume capacity not less than indicated, and threaded ends for sizes 50 mm and smaller, otherwise flanged.

2.5.4 Earthquake Automatic Gas Shutoff Valve

NOTE: Provide this earthquake protective feature .

ANSI Z21.70 and UL listed or AGA listed or International Association of Plumbing and Mechanical Officials (IAPMO) listed. The valve may be either pendulum or ball construction with [remote [electronic] [or] [electric]] actuator.

2.6 GAS METER

**NOTE: Do not use cast-iron material for valve body
or gas-meter body in .**

UNI 7987, UNI 7988/FA-1, and UNI 11003, [pipe] [pedestal] mounted, diaphragm style, [enamel coated steel] [aluminum] case. Provide combined register totalizer, water escape hole in housing, and means for sealing against tampering.

2.7 GAS EQUIPMENT CONNECTORS

- a. Flexible Connectors: UNI 7140/FA-1 and UNI EN 1762.
- b. Quick Disconnect Couplings: UNI 9892 and UNI ISO 6150.
- c. Semi-Rigid Tubing and Fittings: UNI 9891.

2.8 VALVE BOX

Provide [street valve box with cast-iron cover and two-piece 130 mm shaft-slip valve box extension] [rectangular concrete valve box, sized large enough for removal of valve without removing box]. Cast the word "Gas" into the box cover in both English and Italian. Use valve box for areas as follows:

- a. Roads and Traffic Areas: Heavy duty, cast iron cover.
- b. Other Areas: Standard duty, concrete cover.

[c. Airfields and Special Loadings: As detailed.]

2.9 CASING

Where indicated at railroad or other crossing, provide UNI 9099, galvanized pipe, Schedule 40 [, with extruded polyethylene coating].

2.10 BURIED UTILITY WARNING AND IDENTIFICATION TAPE

Provide detectable aluminum-foil plastic-backed tape or detectable magnetic plastic tape manufactured specifically for warning and identification of buried piping. Tape shall be detectable by an electronic detection instrument. Provide tape in rolls, 75 mm minimum width, color-coded yellow for natural gas, with warning and identification imprinted in bold black letters continuously and repeatedly over entire tape length. Warning and identification shall be "CAUTION BURIED GAS PIPING BELOW" or similar wording in both English and Italian languages. Use permanent code and letter coloring unaffected by moisture and other substances contained in trench backfill material.

2.11 HANGERS AND SUPPORTS

UNI 5311.

2.12 WELDING FILLER METAL

UNI EN ISO 3677.

2.13 PIPE-THREAD TAPE

Antiseize and sealant tape of polytetrafluoroethylene (PTFE).

2.14 BOLTING (BOLTS AND NUTS)

Stainless steel bolting; UNI 3740-1 and UNI 7323/1 for bolts and nuts. Dimensions of bolts, studs, and nuts shall conform with UNI 5731 and UNI 5732 with coarse threads conforming to UNI 5732. Bolts or bolt-studs shall extend through the nuts and may have reduced shanks of a diameter not less than the diameter at root of threads. Bolts shall have UNI regular square or heavy hexagon heads; nuts shall be UNI heavy semifinished hexagonal.

2.15 GASKETS

Fluorinated elastomer, compatible with flange faces.

2.16 IDENTIFICATION FOR ABOVEGROUND PIPING

UNI 5634 for legends and type and size of characters. For pipes 19 mm od and larger, provide printed legends to identify contents of pipes and arrows to show direction of flow. Color code label backgrounds to signify levels of hazard. Make labels of plastic sheet with pressure-sensitive adhesive suitable for the intended application. For pipes smaller than 19 mm od, provide brass identification tags 40 mm in diameter with legends in

depressed black-filled characters.

[2.17 (LIQUEFIED PETROLEUM GAS) LPG CONTAINERS AND ACCESSORIES

D.M. 13/10/94, D.M. 10/5/01, UNI 8213, and UNI 10832 containers with appurtenances, system working pressure, minimum design pressure, that is LPG vapor pressure at 38 degrees C, and water capacity as indicated. Provide containers with piping and fittings, [fuse plugs], [hose and flexible hose connectors], [gas-air mixer], strainer, and marking conforming to D.M. 13/10/94 and D.M. 10/5/01.

]PART 3 EXECUTION

3.1 INSTALLATION

Install gas piping, [distribution piping] appliances, and equipment in accordance with UNI EN 1775, D.M. 24/11/84, and D.M. 16/11/99. [Install and store liquefied petroleum gas piping, appliances, and equipment in accordance with D.M. 13/10/94 and D.M. 10/5/01.]

3.1.1 Excavating and Backfilling

Perform excavating and backfilling of pipe trenches as specified in Section 02315, "Excavation and Fill." Place pipe in accordance with requirements of UNI 10576 and D.M. 24/11/84, paragraph 2.4, and directly in trench bottom and cover with minimum 75 mm of sand to top of pipe. If trench bottom is rocky, place pipe on a 75 mm bed of sand and cover as above. Provide remaining backfilling. Coordinate provision of utility warning and identification tape with backfill operation. Bury utility warning and identification tape with printed side up at a depth of 305 mm below the top surface of earth or the top surface of the subgrade under pavements.

3.1.2 Piping

Cut pipe to actual dimensions and assemble to prevent residual stress. [Provide supply connections entering the buildings as indicated.] Within buildings, run piping parallel to structure lines and conceal in finished spaces. Terminate each vertical supply pipe to burner or appliance with tee, nipple and cap to form a sediment trap. To supply multiple items of gas-burning equipment, provide manifold with inlet connections at both ends.

3.1.2.1 Cleanliness

Clean inside of pipe and fittings before installation. Blow lines clear using 550 to 690 kPa (gage) clean dry compressed air. Rap steel lines sharply along entire pipe length before blowing clear. Cap or plug pipe ends to maintain cleanliness throughout installation.

3.1.2.2 Aboveground Steel Piping

Determine and establish measurements for piping at the job site and accurately cut pipe lengths accordingly. For 50 mm diameter and smaller, use threaded or socket-welded joints. For 65 mm diameter and larger, use flanged or butt-welded joints.

- a. Threaded Joints: Where possible use pipe with factory-cut threads, otherwise cut pipe ends square, remove fins and burrs, and cut taper pipe threads in accordance with UNI ISO 7-1. Provide threads smooth, clean, and full-cut. Apply anti-seize paste or tape to male threads portion. Work piping into place without springing or forcing. Backing off to permit alignment of threaded joints will not be permitted. Engage threads so that not more than three threads remain exposed. Use unions for connections to [valves] [meters] for which a means of disconnection is not otherwise provided.
- b. Welded Joints: Weld by the shielded metal-arc process, using covered electrodes and in accordance with procedures established and qualified in accordance with UNI EN 288-2/A1.
- c. Flanged Joints: Use flanged joints for connecting welded joint pipe and fittings to valves to provide for disconnection. Install joints so that flange faces bear uniformly on gaskets. Engage bolts so that there is complete threading through the nuts and tighten so that bolts are uniformly stressed and equally torqued.
- d. Pipe Size Changes: Use reducing fittings for changes in pipe size. Size changes made with bushings will not be accepted.
- e. Painting: Paint new ferrous metal piping, including supports, in accordance with Section 09900, "Paints and Coatings." Do not apply paint until piping tests have been completed.
- f. Identification of Piping: Identify piping aboveground in accordance with UNI 5634, using adhesive-backed or snap-on plastic labels and arrows. In lieu of labels, identification tags may be used. Apply labels or tags to finished paint at intervals of not more than 15 meters. Provide two copies of the piping identification code framed under glass and install where directed.

3.1.2.3 Buried Plastic Lines

Provide totally PE piping. Prior to installation, obtain printed instructions and technical assistance in proper installation techniques from pipe manufacturer. [When joining new PE pipe to existing pipe line, ascertain what procedural changes in the fusion process is necessary to attain optimum bonding.]

- a. PE Piping: Prior to installation, Contractor shall have supervising and installing personnel, certified in accordance with paragraph entitled "Welder's Qualifications." Provide fusion-welded joints except where transitions have been specified. Welding shall be preformed in accordance with UNI 10520, UNI 10521, and UNI 10967. Use electrically heated tools, thermostatically controlled and equipped with temperature indication. (Where connection must be made to existing plastic pipe, contractor shall be responsible for determination of compatibility of materials and procedural changes in fusion process necessary to attain maximum

integrity of bond.)

- b. Laying PE Pipe: Bury pipe 600 mm below finish grade [or deeper when indicated]. Lay in accordance with manufacturer's printed instructions.

3.1.2.4 Connections to Existing Pipeline

When making connections to live gas mains, use pressure tight installation equipment operated by workmen trained and experienced in making hot taps. For connections to existing underground pipeline or service branch, use transition fittings for dissimilar materials.

3.1.2.5 Wrapping

Where connection to existing steel line is made underground, tape wrap new steel transition fittings and exposed existing pipe having damaged coating. Clean pipe to bare metal. Initially stretch first layer of tape to conform to the surface while spirally half-lapping. Apply a second layer, half-lapped and spiralled as the first layer, but with spirals perpendicular to first wrapping. Use 0.025 mm minimum thick polyethylene tape. In lieu of tape wrap, heat shrinkable 0.025 mm minimum thick polyethylene sleeve may be used.

3.1.3 Valves

Install valves approximately at locations indicated. Orient stems vertically, with operators on top, or horizontally. [Provide support for valves to resist operating torque applied to PE pipes.]

3.1.3.1 Pressure Regulator

Provide [plug cock] [or] [ball valve] ahead of regulator. [Install regulator outside of building and 450 mm aboveground on riser.] [Install regulator inside building and extend a full-size vent line from relief outlet on regulator to a point outside of building.] [Install gas meter in conjunction with pressure regulator]. On outlet side of [regulator] [meter], provide a union and a 10 mm gage tap with plug.

3.1.3.2 Stop Valve and Shutoff Valve

Provide stop valve on service branch at connection to main and shut-off valve on riser outside of building.

3.1.4 Pipe Sleeves

[Comply with Section 07840, "Firestopping."] Where piping penetrates concrete or masonry wall, floor or firewall, provide pipe sleeve poured or grouted in place. Make sleeve of steel or cast-iron pipe of such size to provide 6 mm or more annular clearance around pipe. Extend sleeve through wall or slab and terminate flush with both surfaces. Pack annular space with oakum, and caulk at ends with silicone construction sealant.

3.1.5 Piping Hangers and Supports

NOTE: Provide seismic restraints in accordance with
SMACNA SRM.

Selection, fabrication, and installation of piping hangers and supports shall conform with UNI 5311, unless otherwise indicated. Provide seismic restraints in accordance with SMACNA SRM.

3.1.6 Final Connections

Make final connections to equipment and appliances using rigid pipe and fittings, except for the following:

3.1.6.1 Domestic Water Heaters

Connect with UNI-Approved semi-rigid tubing and fittings.

3.1.6.2 Kitchen Equipment

Install UNI-Approved gas equipment connectors. Connectors shall be long enough [to permit movement of equipment for cleaning] [and] [to afford access to coupling].

3.2 FIELD QUALITY CONTROL

3.2.1 Metal Welding Inspection

Inspect for compliance with UNI EN 287-1/A1. Replace, repair, and then re-inspect defective welds.

3.2.2 PE Fusion Welding Inspection

Visually inspect butt joints by comparing with, manufacturer's visual joint appearance chart. Inspect fusion joints for proper fused connection in accordance with UNI 10520, UNI 10521, and UNI 10967. Replace defective joints by cutting out defective joints or replacing fittings. Inspect 100 percent of all joints and reinspect all corrections. Arrange with the pipe manufacturer's representative in the presence of the Contracting Officer to make first time inspection.

3.2.3 Pressure Tests

NOTE: D.M. 24/11/84 requires pressure test to be performed after installation. Test must be hydraulically performed except pipe diameter is less than 100 mm, air or natural gas may be used. Test pressures must be:

1.2 times maximum working pressure for 1st type pipes.

1.3 times maximum working pressure for 2nd type pipes.

1.5 times maximum working pressure for 3rd type pipes.

UNI 9165 covers test pressures for pipes of 4th, 5th, 6th, and 7th type pipes as follows:

1.5 times maximum working pressure for 4th and 5th type pipes.

1 bar pressure for 6th and 7th type pipes.

Use test pressure of [1.2] [1.3] [1.5] times maximum working pressure. Do not test until every joint has set and cooled at least 8 hours at temperatures above 10 degrees C. Conduct testing before backfilling; however, place sufficient backfill material between fittings to hold pipe in place during tests. Test system gas tight in accordance with D.M. 24/11/84, para. 2.5.1 and UNI 9165/A1/A2. Use clean dry air or inert gas for testing. Systems which may be contaminated by gas shall first be purged as specified. Make tests on entire system or on sections that can be isolated by valves. After pressurization, isolate entire piping system from sources of air during test period. Maintain test pressure for at least [24 hours (per UNI 9165/A1/A2)] [48 hours (per D.M. 24/11/84)] between times of first and last reading of pressure and temperature. Take first reading at least one hour after test pressure has been applied. Do not take test readings during rapid weather changes. Provide temperature same as actual trench conditions. There shall be no reduction in the applied test pressure other than that due to a change in ambient temperature. Allow for ambient temperature change in accordance with the relationship $PF + 101.32 = (P1 + 101.32) (T2 + 273) / T1 + 273$, in which "T" and "PF" represent Centigrade temperature and gage pressure, respectively, subscripts "1" and "2" denote initial and final readings, and "PF" is the calculated final pressure. If "PF" exceeds the measured final pressure (final gage reading) by 3 1/2 kPa or more, isolate sections of the piping system, retest each section individually, and apply a solution of warm soapy water to joints of each section for which a reduction in pressure occurs after allowing for ambient temperature change. Repair leaking joints and repeat test until no reduction in pressure occurs. In performing tests, use a test gage calibrated in 7 kPa increments and readable to 3 1/2 kPa.

3.2.4 System Purging

After completing pressure tests, and before testing a gas contaminated line, purge line with nitrogen at junction with main line to remove all air and gas. Clear completed line by attaching a test pilot fixture at capped stub-in line at building location and let gas flow until test pilot ignites.

-CAUTION-

Failure to purge may result in explosion

-CAUTION-
within line when air-to-gas is at correct
mixture.

-- End of Section --